

VU/PPM LED Level Meter Modules

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Diagrams	PCB No.	Diagram	Component Layout	Parts List
VU/PPM 30 LED with GRM	1.913.293.00	1.913.293.00	1.913.293.00	1.913.293.00
VU/PPM 30 LED	1.913.294.00		1.913.293.00	1.913.294.00
LED PPM Meter (10 LED)	1.913.291.00	1.913.291.00	1.913.291.00	1.913.291.00

Scope of Validity

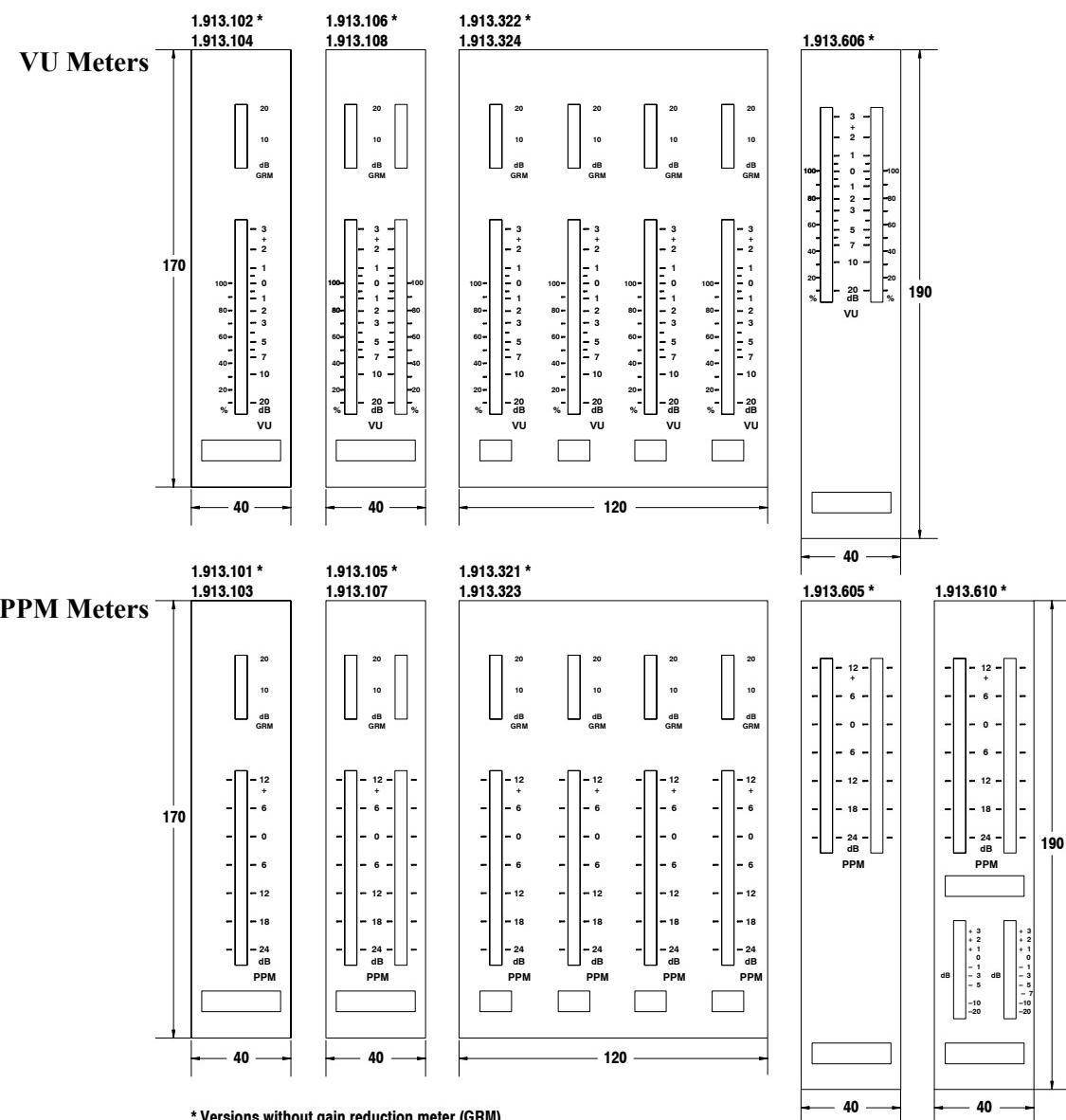
These instructions apply to the following assemblies:

Display	1 Channel, dark front panel	2 Channels, dark front panel	2 Channels, bright front panel	4 Channels, dark front panel	PCB No.
PPM	1.913.101	1.913.105	1.913.605	1.913.321	1.913.294
VU	1.913.102	1.913.106	1.913.606	1.913.322	1.913.294
PPM w. GRM	1.913.103	1.913.107	-	1.913.323	1.913.293
VU w. GRM	1.913.104	1.913.108	-	1.913.324	1.913.293
PPM w. additional small level meter	-	-	1.913.610	-	1.913.294, 1.913.291

1 General

The Level Meter units with 30 LEDs have been developed for installation in the display panel of Studer Mixing Consoles. Instruments with VU (volume unit) and PPM (peak program meter) characteristics, with or without gain reduction meter (GRM) are available. Instead of bar-graph indication, also dot indication is optionally available.

The instruments listed below are equipped with the PCBs 1.913.294 (VU or PPM) or 1.913.293 (VU or PPM with gain reduction meter) according to the table above. Please consult the circuit diagram relating to the corresponding assembly number.



2 Functional Description

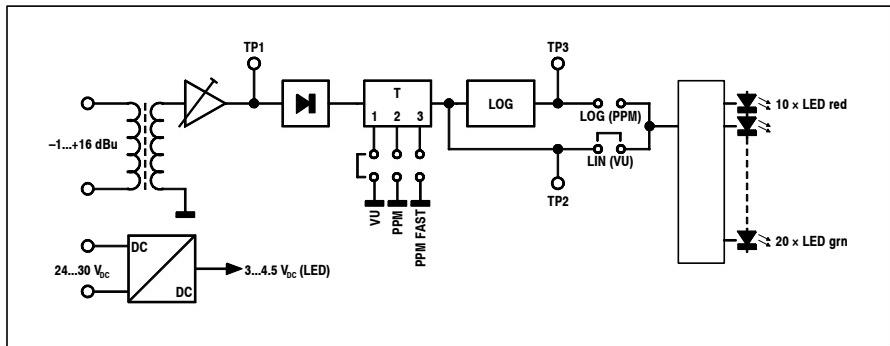
- PPM:** The peak program meter is a quasi-peak value instrument with long decay time. When a signal voltage corresponding to a level of 0 dB is applied for 10 ms, the resulting indication is –1 dB. Decay time (0 to –20 dB) is 1.7 s.
- VU Meter:** The VU meter indicates signals according to the standard defined by ANSI 1954. When a signal with a duration of 300 ms is applied, the indication is 99% of the reference value. Rise and decay times on a VU meter are identical. The factory-set lead is +6 dB.
- Gain Reduction Meter:** When the limiter/compressor is switched on, the GRM indicates the magnitude of the gain reduction.
- Small PPM:** The assembly 1.913.610 contains an additional small PPM meter with 10 LEDs, normally used for AUX level indication.
- Bar/Dot Display Selection:** On each of the PCBs, selection of bar or dot display mode is provided. All level meters are factory-set to bar display mode; dot display mode is unusual and recommended only if extra-low current consumption is required.

PCB No.	Bar Display Mode (Default Factory Setting)	Dot Display Mode	
1.913.293.00 (VU/PPM 30 LED w. GRM)	insert: R3, R8, R10, R15 remove: R4, R9, R11, R14	insert: R4, R9, R11, R14 remove: R3, R8, R10, R15	
1.913.294.00 (VU/PPM 30 LED)	insert: R3, R8, R10 remove: R4, R9, R11	insert: R4, R9, R11 remove: R3, R8, R10	
1.913.291.00 (PPM 10 LED)	insert jumper JS201	remove jumper JS201	

3 Technical Specifications

General:	0 dBu \pm 0.775 V _{rms}		
	Sensitivity for reference indication	–1 dBu ... +16 dBu	
	Input impedance	>10 k Ω	
	Supply	± 15 V _{DC}	+24 V _{DC}
	Current consumption without GRM (p. ch., bar display mode)	Quiescent: Full load:	45 mA 80 mA
	Current consumption with GRM (p. ch., bar display mode)	Quiescent: Full load:	55 mA 105 mA
VU Meter (1.913.293):	Indication range	–20 VU ... +3 VU	
	Accuracy (conditions: –10...+3 VU, 0...+50° C, 31.5 Hz...16 kHz)	\pm 1 segment	
	Response time to –1 VU	207 ms \pm 30 ms	
PPM (1.913.293):	Indication range	–30 dBu ... +15 dBu	
	Accuracy (conditions: –30...+15 VU, 0...+50° C, 31.5 Hz...16 kHz)	\pm 1 segment	
	Dynamic behavior		
	Jumper "normal" 0 dB, 10 ms burst	Indication:	–1 dB \pm 0.5 dB
	0 dB, 3 ms burst	Indication:	–4 dB \pm 1 dB
	Jumper "fast" 0 dB, 100 μ s burst	Indication:	–1 dB
GRM (1.913.294):	Decay time: 0...–20 dB	1.7 s \pm 0.3 s	
	Input voltage range	min. control: 0 V ... +2 V _{DC}	max. control: 0 V ... +11 V _{DC}
Dimensions:	1- and 2-channel units, dark front panel (w \times h \times d)	40 \times 170 \times 97 mm	
	2-channel units, bright front panel (w \times h \times d)	40 \times 190 \times 97 mm	
	4-channel units, dark front panel (w \times h \times d)	120 \times 170 \times 97 mm	

4 VU/PPM Meter Block Diagram



VU/PPM meter block diagram: VU/PPM/PPM FAST and LIN/LOG settings are established with jumpers J2 and J3, respectively.

5 Alignment

Required Instruments: AC voltmeter, $R_i \geq 20 \text{ k}\Omega$
DC voltmeter, $R_i \geq 100 \text{ k}\Omega$
AF generator, 31.5 Hz ... 16 kHz, 0...16 dBu; attenuator with 10 dB increments.

DC/DC Converter Check: Connect DC voltmeter to TP5 (hot) and TP4 (ground). Feed generator output signal with line level (-1...+16 dBu) to the input (pins 5 and 7 of P1, or TP8 and TP9); all green LEDs are on.
DC voltmeter reading should be:
 $3.1 \pm 0.1 \text{ V}_{\text{DC}}$ (supply: +24 V_{DC}),
 $4.1 \pm 0.1 \text{ V}_{\text{DC}}$ (supply: +30 V_{DC}).

Input Range: Feed generator output signal with line level (1 kHz, -1...+16 dBu) to the input (pins 5 and 7 of P1, or TP8 and TP9).
Connect AC voltmeter to test points TP1 (hot) and TP4 (ground). Reading must be adjustable with RA3 to $290 \pm 10 \text{ mV}_{\text{AC}}$ for the complete input level range.

Line Level: Feed generator output signal with your line level (1 kHz, range: -1...+16 dBu) to the input (pins 5 and 7 of P1, or TP8 and TP9).
Adjust RA3 until all green LEDs are on. The red LEDs must be dark.
(TP3: $2.5 \pm 0.1 \text{ V}_{\text{DC}}$).

Rectifier and Indication: Set J2 to VU, J3 to LIN.
Feed generator output signal with your line level (1 kHz, usually 0 dBu) to the input (pins 5 and 7 of P1, or TP8 and TP9).
Connect AC voltmeter to test points TP1 (hot) and TP4 (ground). Adjust with RA3 to $290 \pm 10 \text{ mV}_{\text{AC}}$. All green LEDs must be on.
Connect DC voltmeter to test points TP2 (hot) and TP4 (ground); the meter should read $-380 \pm 15 \text{ mV}_{\text{DC}}$.
Connect DC voltmeter to test points TP3 (hot) and TP4 (ground); the meter should read $+2.575 \pm 0.100 \text{ V}_{\text{DC}}$. All green LEDs must be on.
Check: Set generator output for a DC voltmeter reading of $3.8 \pm 0.1 \text{ V}_{\text{DC}}$. All LEDs must be on. Set generator output for a DC voltmeter reading of $170 \pm 20 \text{ mV}_{\text{DC}}$. Only the lowest LED must be on.

Log Converter (PPM only): Set J2 to PPM, J3 to LOG.

Feed generator output signal (1 kHz, +6 dBu) to the input (pins 5 and 7 of P1, or TP8 and TP9).

Connect DC voltmeter to test points TP2 (hot) and TP4 (ground). Adjust with RA3 to 1.18 ± 0.05 V_{DC}.

RA1 and RA2: Basic setting according to the arrows in the diagram below.
Procedure:

1. Upper value setting: Adjust with RA2 to 3.06 ± 0.10 V_{DC}. All green LEDs and four red LEDs must be on (+6 dB indication).
 2. Set generator output to -24 dBu (i.e., attenuate the +6 dBu setting from above by 30 dB).
 3. Lower value setting: Adjust with RA1 to 560 ± 20 mV_{DC}. Only the four lowest green LEDs must be on (-24 dB indication).
 4. These two settings are interdependent, therefore repeat steps 1...3 several times.

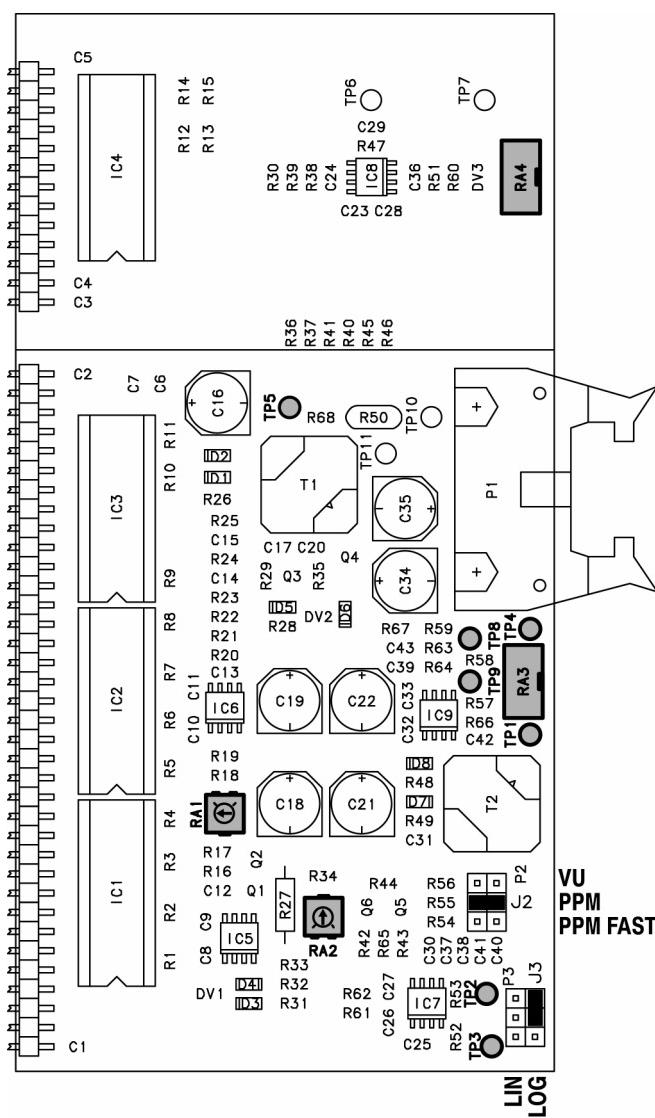
GRM (if included):

Connect the Meter Unit to the console.

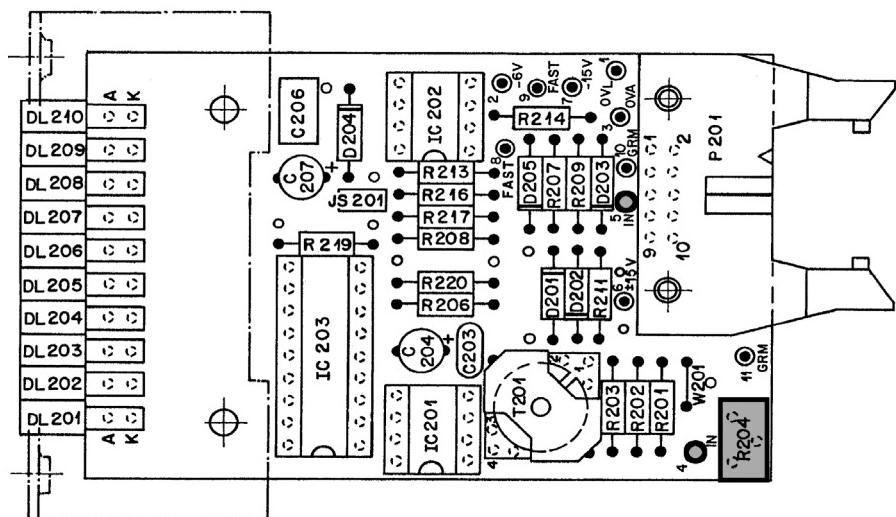
Feed a test signal via an input channel. Set the level on the master output to nominal level +20 dB.

Switch the limiter on.

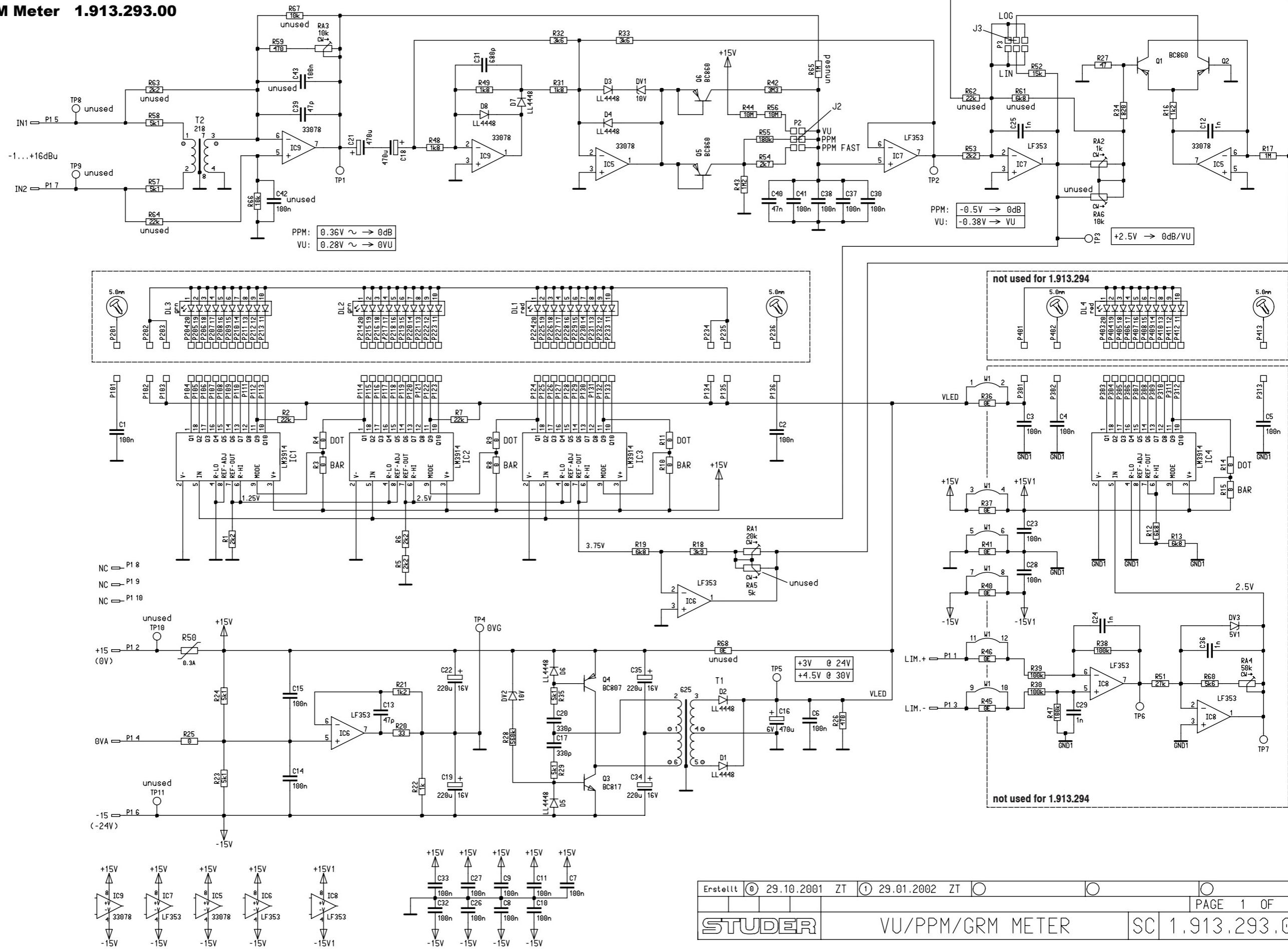
Align with RA4 to a GRM indication of 20 dB.

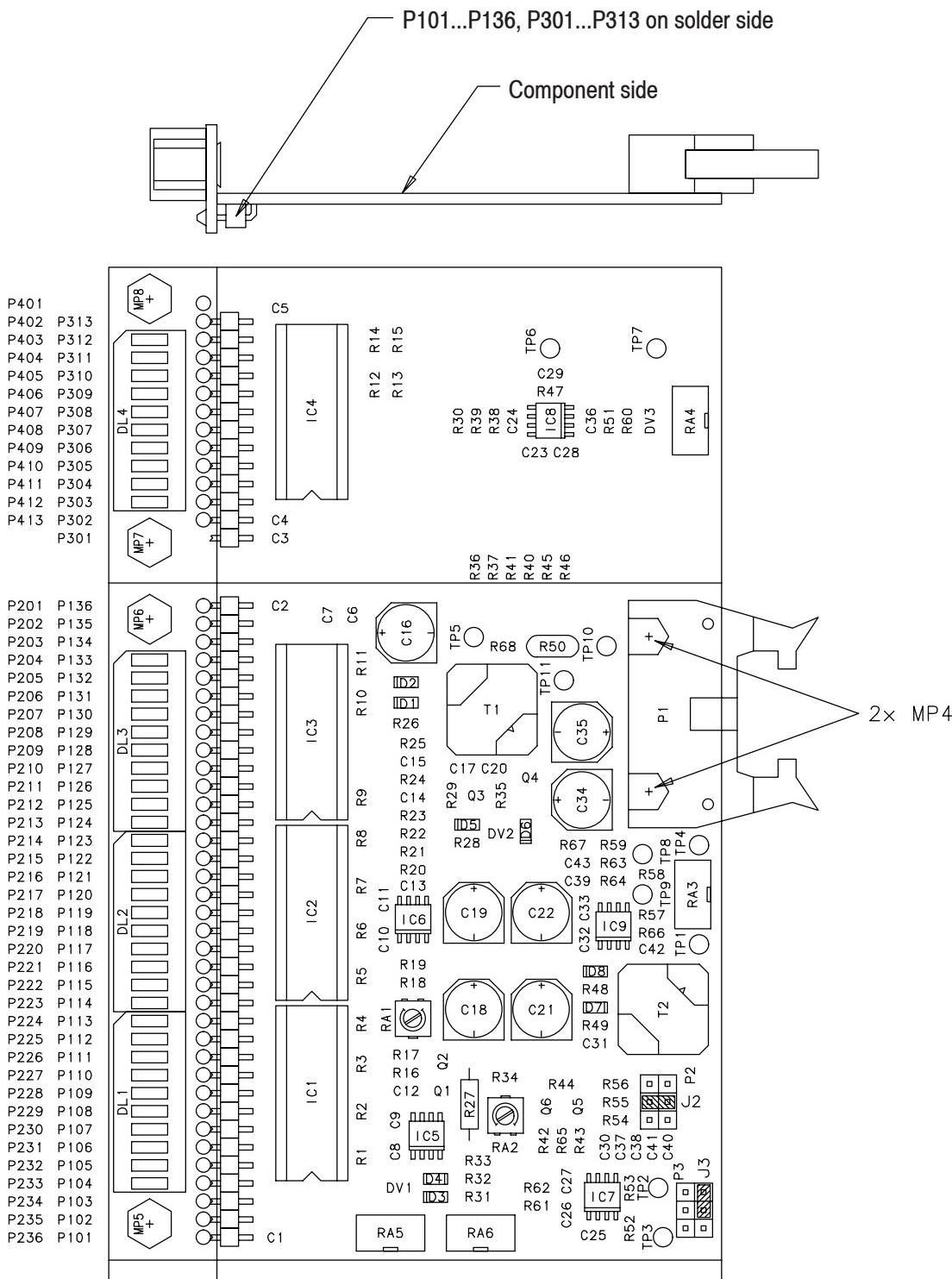


Line Level for 1.913.291: Feed generator output signal with your line level (1 kHz, range: +6...+15 dBu) to the input (pins 5 and 7 of P201, or TP5 and TP4). Adjust R204 until all green LEDs are on. The red LEDs must be dark.



VU/PPM/GRM Meter 1.913.293.00



VU/PPM/GRM Meter 1.913.293.00

Accompanying documents: Zugehoerige Unterlagen: PL	General tolerance: Freimassstoleranz: . .	Scale: Massstab: 1 : 1	Edition Ausgabe 29.10.2001	ZT	ML	HW	(0)
Substitute for: Ersatz fuer: . .			Page: Seite: 1 / 1				
STUDER REGENSDORF	Description: Benennung: VU/PPM/GRM METER , ESE	Z	Date: Datum: Number: Nummer:	Visa Gez. Checked Gepr. Seen Ges.	Index		
			1.913.293.00				

VU/PPM/GRM Meter 1.913.293.00 (4)

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Idx.	Pos.	Part No.	Qty.	Type/Val.	Description
0	C 1	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 2	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 3	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 4	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 5	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 6	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 7	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 8	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 9	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 10	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 11	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 12	59.60.2373	1	pce	1n0 CER 50V, 5%, COG, 0805
0	C 13	59.60.2241	1	pce	47p CER 50V, 5%, COG, 0603
0	C 14	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 15	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 16	59.68.0033	1	pce	47u EL 6V, 8.0*10.7
0	C 17	59.60.2361	1	pce	330p CER 50V, 5%, COG, 0805
0	C 18	59.68.0033	1	pce	47u EL 6V, 8.0*10.7
0	C 19	59.68.0073	1	pce	220u EL 16V, 8.0*10.7
0	C 20	59.60.2361	1	pce	330p CER 50V, 5%, COG, 0805
0	C 21	59.68.0033	1	pce	47u EL 6V, 8.0*10.7
0	C 22	59.68.0073	1	pce	220u EL 16V, 8.0*10.7
0	C 23	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 24	59.60.2373	1	pce	1n0 CER 50V, 5%, COG, 0805
0	C 25	59.60.2373	1	pce	1n0 CER 50V, 5%, COG, 0805
0	C 26	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 27	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 28	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 29	59.60.2373	1	pce	1n0 CER 50V, 5%, COG, 0805
0	C 30	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 31	59.60.2369	1	pce	680p CER 50V, 5%, COG, 0805
0	C 32	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 33	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 34	59.68.0073	1	pce	220u EL 16V, 8.0*10.7
0	C 35	59.68.0073	1	pce	220u EL 16V, 8.0*10.7
0	C 36	59.60.2373	1	pce	1n0 CER 50V, 5%, COG, 0805
0	C 37	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 38	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	C 39	59.60.2241	1	pce	47p CER 50V, 5%, COG, 0603
0	C 40	59.60.3333	1	pce	47n CER 50V, 10%, X7R, 0805
0	C 41	59.60.3337	1	pce	100n CER 50V, 10%, X7R, 0805
0	D 1	50.60.8001	1	pce	4448 200mA 75V 4ns SOD 80
0	D 2	50.60.8001	1	pce	4448 200mA 75V 4ns SOD 80
0	D 3	50.60.8001	1	pce	4448 200mA 75V 4ns SOD 80
0	D 4	50.60.8001	1	pce	4448 200mA 75V 4ns SOD 80
0	D 5	50.60.8001	1	pce	4448 200mA 75V 4ns SOD 80
0	D 6	50.60.8001	1	pce	4448 200mA 75V 4ns SOD 80
0	D 7	50.60.8001	1	pce	4448 200mA 75V 4ns SOD 80
0	D 8	50.60.8001	1	pce	4448 200mA 75V 4ns SOD 80
0	DL 1	50.04.2150	1	pce	MV57164 10*LED-Bargraf rot diffus
0	DL 2	50.04.2161	1	pce	GRN DLZ MV 54 164, LTA1000G 10*D GN
0	DL 3	50.04.2161	1	pce	GRN DLZ MV 54 164, LTA1000G 10*D GN
0	DL 4	50.04.2150	1	pce	MV57164 10*LED-Bargraf rot diffus
0	DV 1	50.60.9017	1	pce	10V 5%, 0.2W, SOT 23
0	DV 2	50.60.9017	1	pce	10V 5%, 0.2W, SOT 23
0	DV 3	50.60.9010	1	pce	5V1 5%, 0.2W, SOT 23
4	DV 4	50.04.1112	1	pce	5V1 Zener, 5%, 0.5W, DO-35
0	IC 1	50.11.0119	1	pce	LM3914 IC LM 3914 N,
0	IC 2	50.11.0119	1	pce	LM3914 IC LM 3914 N,
0	IC 3	50.11.0119	1	pce	LM3914 IC LM 3914 N,
0	IC 4	50.11.0119	1	pce	LM3914 IC LM 3914 N,
0	IC 5	50.61.0204	1	pce	MC33078 Dual Op-Amp low noise
0	IC 6	50.61.0207	1	pce	LF353 Dual Op-Amp JFET SO 8
3	IC 7	50.61.0209	1	pce	LF412 Dual Op-Amp JFET SO 8
0	IC 8	50.61.0207	1	pce	LF353 Dual Op-Amp JFET SO 8
1	IC 9	50.61.0204	1	pce	MC33078 Dual Op-Amp low noise
0	J 2	54.01.0021	1	pce	Jumper 0.63*0.63mm, Au
0	J 3	54.01.0021	1	pce	Jumper 0.63*0.63mm, Au
0	MP 1	1.913.293.11	1	pce	VU/PPM/GRM METER PCB
0	MP 2	1.913.293.10	1	pce	NR-ETIKETTE 5 * 20
0	MP 3	43.01.0108	1	pce	Label ESE-Warnschild
0	MP 4	28.99.0119	2	pcs	ROHRNIETE D 2.5*0.15* 9
0	MP 5	1.010.057.22	1	pce	Nietmutter sw 6
0	MP 6	1.010.057.22	1	pce	Nietmutter sw 6
0	MP 7	1.010.057.22	1	pce	Nietmutter sw 6
0	MP 8	1.010.057.22	1	pce	M3*7.4 Nietmutter sw 6
4	MP 9	43.10.0113	1	pce	D Revisions-Etikette 5mm h'blau
0	P 1	54.14.2011	1	pce	10p Winkelstecker Au
0	P 2	54.11.0136	1	pce	2*3p Pin 0.63*0.63, RM2.54
0	P 3	54.11.0136	1	pce	2*3p Pin 0.63*0.63, RM2.54
0	P 102	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 103	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 104	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 105	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 106	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 107	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 108	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 109	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 110	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 111	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 112	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 113	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 114	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 115	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 116	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 117	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 118	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 119	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 120	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 121	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 122	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 123	54.11.0125	1	pce	1p Pin, 1reihig, winkel

Idx.	Pos.	Part No.	Qty.	Type/Val.	Description
0	P 124	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 125	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 126	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 127	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 128	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 129	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 130	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 131	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 132	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 133	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 134	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 135	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 136	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 301	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 302	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 303	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 304	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 305	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 306	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 307	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 308	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 309	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 310	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 311	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 312	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	P 313	54.11.0125	1	pce	1p Pin, 1reihig, winkel
0	Q 1	50.60.1002	1	pce	BC860C PNP 45V 100mA SOT 23
0	Q 2	50.60.1002	1	pce	BC860C PNP 45V 100mA SOT 23
0	Q 3	50.60.0050	1	pce	BC817-25 NPN 45V 800mA SOT 23
0	Q 4	50.60.1050	1	pce	BC807-25 PNP 45V 800mA SOT 23
0	Q 5	50.60.1002	1	pce	BC860C PNP 45V 100mA SOT 23
0	Q 6	50.60.1002	1	pce	BC860C PNP 45V 100mA SOT 23
0	R 1	57.60.1222	1	pce	2k2 MF, 1%, 0204, E24
0	R 2	57.60.1223	1	pce	22k MF, 1%, 0204, E24
0	R 3	57.60.1000	1	pce	0R0 MF, 0204
0	R 4	not used	1	pce	0R0 MF, 0204
0	R 5	57.60.1222	1	pce	2k2 MF, 1%, 0204, E24
0	R 6	57.60.1222	1	pce	2k2 MF, 1%, 0204, E24
0	R 7	57.60.1222	1	pce	22k MF, 1%, 0204, E24
0	R 8	57.60.1000	1	pce	0R0 MF, 0204
0	R 9	not used	1	pce	0R0 MF, 0204
0	R 10	57.60.1000	1	pce	0R0 MF, 0204
0	R 11	not used	1	pce	0R0 MF, 0204
0	R 12	57.60.1682	1	pce	6k8 MF, 1%, 0204, E24
0	R 13	57.60.1682	1	pce	6k8 MF, 1%, 0204, E24
0	R 14	57.60.1000	1	pce	0R0 MF, 0204
0	R 15	57.60.1222	1	pce	1k2 MF, 1%, 0204, E24
0	R 16	57.60.1102	1	pce	1k0 MF, 1%, 0204, E24
0	R 17	57.60.1105	1	pce	1M0 MF, 1%, 0204, E24
0	R 18	57.60.1392	1	pce	3k9 MF, 1%, 0204, E24
0	R 19	57.60.1682	1	pce	6k8 MF, 1%, 0204, E24
0	R 20	57.60.1330	1	pce	33R MF, 1%, 0204, E24
0	R 21	57.60.1122	1	pce	1k2 MF, 1%, 0204, E24
0	R 22	57.60.1102	1	pce	1k0 MF, 1%, 0204, E24
0	R 23	57.60.1512			

VU/PPM/GRM Meter 1.913.293.00 (4)

Page: 2 of 2

Idx.	Pos.	Part No.	Qty.	Type/Val.	Description
0	TP 5	54.02.0471	1	pce	Stift d 1.5 * 5.5 löt
0	TP 6		not used	1 pce	Stift d 1.5 * 5.5 löt
0	TP 7		not used	1 pce	Stift d 1.5 * 5.5 löt

End of List

Comments:

- (01) Offset-voltage of IC 9 LF 353 too large
->replaced by MC
- (02) R25 not used
- (03) IC7 LF353 replaced by LF412
- (04) DV4 added

Idx.	Pos.	Part No.	Qty.	Type/Val.	Description
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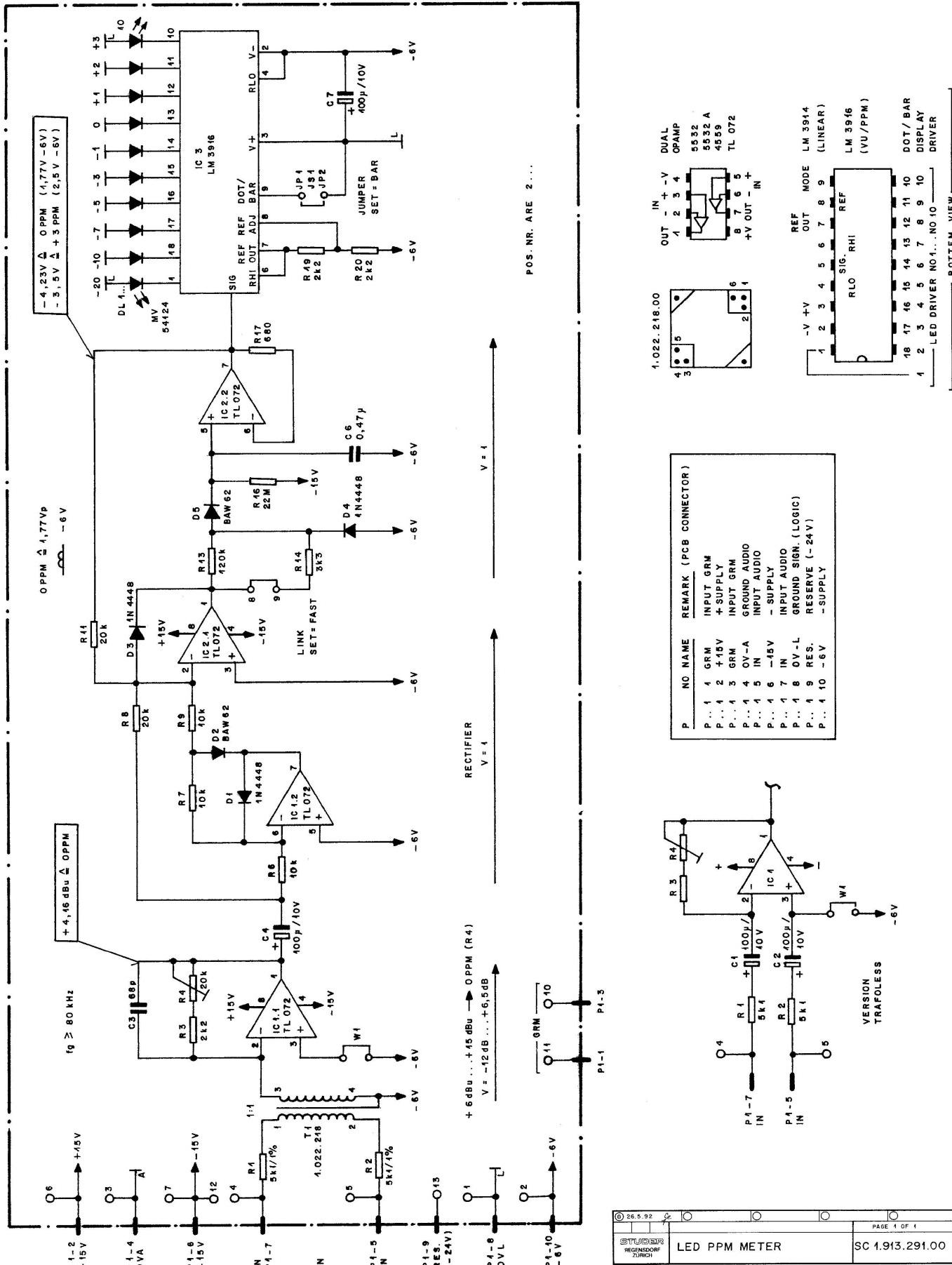
VU/PPM Meter mod. 1.913.294.00 (3)

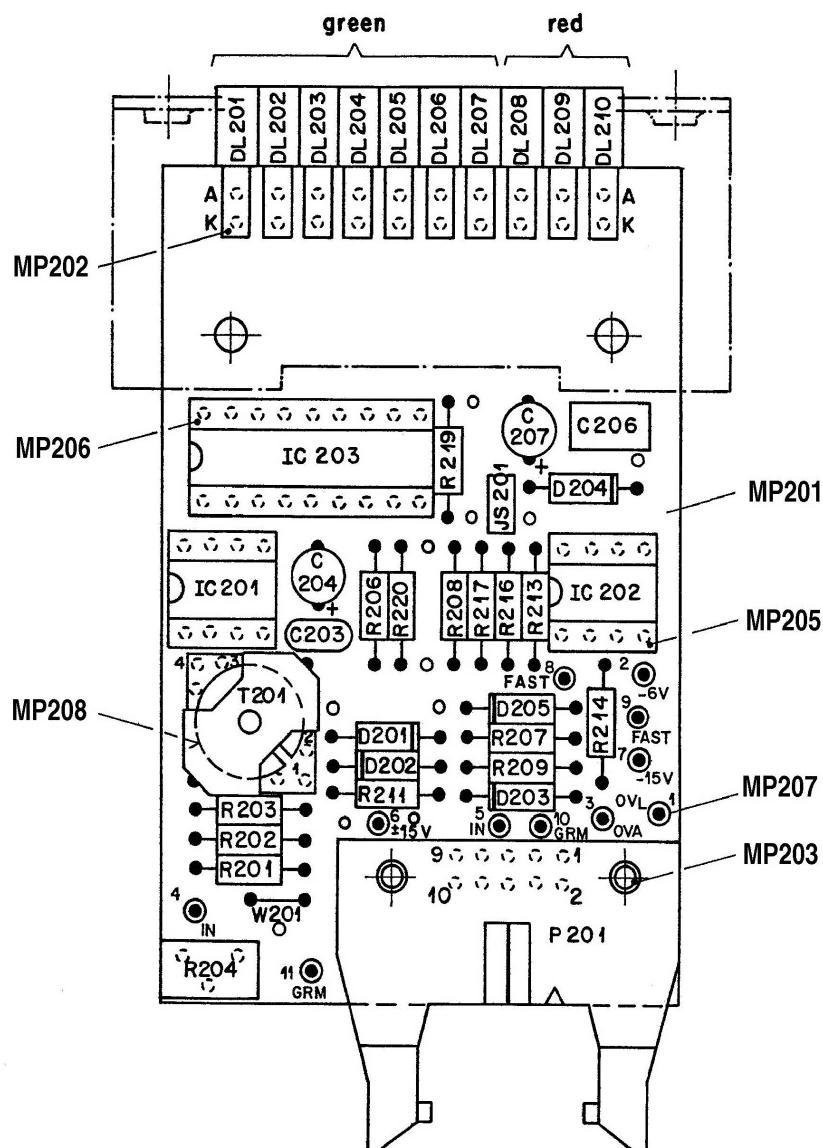
Page: 1 of 1

Idx.	Pos.	Part No.	Qty.	Type/Val.	Description
0	C 1	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 2	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 6	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 7	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 8	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 9	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 10	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 11	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 12	59.60.2373	1 pce	1n0	CER 50V, 5%, COG, 0805
0	C 13	59.60.2241	1 pce	47p	CER 50V, 5%, COG, 0603
0	C 14	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 15	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 16	59.68.0033	1 pce	47u	EL 6V, 8.0*10.7
0	C 17	59.60.2361	1 pce	330p	CER 50V, 5%, COG, 0805
0	C 18	59.68.0033	1 pce	47u	EL 6V, 8.0*10.7
0	C 19	59.68.0073	1 pce	220u	EL 16V, 8.0*10.7
0	C 20	59.60.2361	1 pce	330p	CER 50V, 5%, COG, 0805
0	C 21	59.68.0033	1 pce	47u	EL 6V, 8.0*10.7
0	C 22	59.68.0073	1 pce	220u	EL 16V, 8.0*10.7
0	C 25	59.60.2373	1 pce	1n0	CER 50V, 5%, COG, 0805
0	C 26	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 27	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 30	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 31	59.60.2369	1 pce	680p	CER 50V, 5%, COG, 0805
0	C 32	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 33	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 34	59.68.0073	1 pce	220u	EL 16V, 8.0*10.7
0	C 35	59.68.0073	1 pce	220u	EL 16V, 8.0*10.7
0	C 37	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 38	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	C 39	59.60.2241	1 pce	47p	CER 50V, 5%, COG, 0603
0	C 40	59.60.3333	1 pce	47n	CER 50V, 10%, X7R, 0805
0	C 41	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0	D 1	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0	D 2	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0	D 3	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0	D 4	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0	D 5	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0	D 6	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0	D 7	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0	D 8	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0	DL 1	50.04.2150	1 pce	MV57164	10*LED-Bargraf rot diffus
0	DL 2	50.04.2161	1 pce	GRN	DLZ MV 54 164,LTA1000G 10*D GN
0	DL 3	50.04.2161	1 pce	GRN	DLZ MV 54 164,LTA1000G 10*D GN
0	DV 1	50.60.9017	1 pce	10V	5%, 0.2W, SOT 23
0	DV 2	50.60.9017	1 pce	10V	5%, 0.2W, SOT 23
3	DV 4	50.04.1112	1 pce	5V1	Zener, 5%, 0.5W, DO-35
0	IC 1	50.11.0119	1 pce	LM3914	IC LM 3914 N,
0	IC 2	50.11.0119	1 pce	LM3914	IC LM 3914 N,
0	IC 3	50.11.0119	1 pce	LM3914	IC LM 3914 N,
0	IC 5	50.61.0204	1 pce	MC33078	Dual Op-Amp low noise
0	IC 6	50.61.0207	1 pce	LF353	Dual Op-Amp JFET SO 8
0	IC 7	50.61.0207	1 pce	LF353	Dual Op-Amp JFET SO 8
1	IC 9	50.61.0204	1 pce	MC33078	Dual Op-Amp low noise
0	J 2	54.01.0021	1 pce	Jumper	0.63*0.63mm, Au
0	J 3	54.01.0021	1 pce	Jumper	0.63*0.63mm, Au
0	MP 1	1.913.293.11	1 pce	VU/PPM GRM METER PCB	
0	MP 2	1.913.294.10	1 pce	NR-ETIKETTE 5 * 20	
0	MP 3	43.01.0108	1 pce	Label	ESE-Warnschild
0	MP 4	28.99.0119	2 pces		ROHRNIETE D 2.5*0.15* 9
0	MP 5	1.010.057.22	1 pce	M3*7.4	Nietmutter sw 6
0	MP 6	1.010.057.22	1 pce	M3*7.4	Nietmutter sw 6
3	MP 7	43.10.0112	1 pce	C	Revisions-Etikette 5mm h'blau
0	P 1	54.14.2011	1 pce	10p	Winkelstecker Au
0	P 2	54.11.0136	1 pce	2*3p	Pin 0.63*0.63, RM2.54
0	P 3	54.11.0136	1 pce	2*3p	Pin 0.63*0.63, RM2.54
0	P 101	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 102	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 103	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 104	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 105	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 106	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 107	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 108	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 109	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 110	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 111	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 112	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 113	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 114	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 115	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 116	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 117	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 118	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 119	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 120	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 121	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 122	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 123	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 124	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 125	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 126	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 127	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 128	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 129	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 130	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 131	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 132	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 133	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 134	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 135	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0	P 136	54.11.0125	1 pce	1p	Pin, 1reihig, winkel

Idx.	Pos.	Part No.	Qty.	Type/Val.	Description
0	Q 1	50.60.1002	1 pce	BC860C	PNP 45V 100mA SOT 23
0	Q 2	50.60.1002	1 pce	BC860C	PNP 45V 100mA SOT 23
0	Q 3	50.60.0050	1 pce	BC817-25	NPN 45V 800mA SOT 23
0	Q 4	50.60.1050	1 pce	BC807-25	PNP 45V 800mA SOT 23
0	Q 5	50.60.1002	1 pce	BC860C	PNP 45V 100mA SOT 23
0	Q 6	50.60.1002	1 pce	BC860C	PNP 45V 100mA SOT 23
0	R 1	57.60.1222	1 pce	2k2	MF, 1%, 0204, E24
0	R 2	57.60.1223	1 pce	22k	MF, 1%, 0204, E24
0	R 3	57.60.1000	1 pce	0R0	MF, 0204
0	R 4	not used	1 pce	0R0	MF, 0204
0	R 5	57.60.1222	1 pce	2k2	MF, 1%, 0204, E24
0	R 6	57.60.1222	1 pce	2k2	MF, 1%, 0204, E24
0	R 7	57.60.1223	1 pce	22k	MF, 1%, 0204, E24
0	R 8	57.60.1000	1 pce	0R0	MF, 0204
0	R 9	not used	1 pce	0R0	MF, 0204
0	R 10	57.60.1000	1 pce	0R0	MF, 0204
0	R 11	not used	1 pce	0R0	MF, 0204
0	R 16	57.60.1122	1 pce	1k2	MF, 1%, 0204, E24
0	R 17	57.60.1105	1 pce	1M0	MF, 1%, 0204, E24
0	R 18	57.60.1392	1 pce	3k9	MF, 1%, 0204, E24
0	R 19	57.60.1682	1 pce	6k8	MF, 1%, 0204, E24
0	R 20	57.60.1330	1 pce	33R	MF, 1%, 0204, E24
0	R 21	57.60.1122	1 pce	1k2	MF, 1%, 0204, E24
0	R 22	57.60.1102	1 pce	1k0	MF, 1%, 0204, E24
0	R 23	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
0	R 24	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
2	R 25	not used	1 pce	0R0	MF, 0204
0	R 26	57.60.1471	1 pce	470R	MF, 1%, 0204, E24
0	R 27	57.99.0252	1 pce	47	MF 10%, +4500ppm
0	R 28	57.60.1564	1 pce	560k	MF, 1%, 0204, E24
0	R 29	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
0	R 31	57.60.1182	1 pce	1k8	MF, 1%, 0204, E24
0	R 32	57.60.1362	1 pce	3k6	MF, 1%, 0204, E24
0	R 33	57.60.1362	1 pce	3k6	MF, 1%, 0204, E24
0	R 34	57.60.1821	1 pce	820R	MF, 1%, 0204, E24
0	R 35	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
0	R 42	57.60.1335	1 pce	3M3	MF, 1%, 0204, E24
0	R 43	57.60.1125	1 pce	1M2	MF, 1%, 0204, E24
0	R 44	57.60.1106	1 pce	10M	MF, 1%, 0204, E24
0	R 45	57.60.1182	1 pce	1k8	MF, 1%, 0204, E24
0	R 49	57.60.1182	1 pce	1k8	MF, 1%, 0204, E24
0	R 50	57.92.7012	1 pce	0.3A	PTC 60V
0	R 52	57.60.1153	1 pce	15k	MF, 1%, 0204, E24
0	R 53	57.60.1222	1 pce	2k2	MF, 1%, 0204, E24
0	R 54	57.60.1272	1 pce	2k7	MF, 1%, 0204, E24
0	R 55	57.60.1184	1 pce	180k	MF, 1%, 0204, E24
0	R 56	57.60.1106	1 pce	10M	MF, 1%, 0204, E24
0	R 57	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
0	R 58	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
0	R 59	57.60.1471	1 pce	470R	MF, 1%, 0204, E24
0	R 66	57.60.1103	1 pce	10k	MF, 1%, 0204, E24
0	RA 1	58.60.0121	1 pce	20k	SMD 20% .025W, Cermet
0	RA 2	58.60.0113	1 pce	1	

LED PPM Meter (10 LED) **1.913.291.00**



LED PPM Meter (10 LED) 1.913.291.00

Werkstoff:	Norm-Nr.:	Güte:	Änderung	(3)
DIN-Bez.:				(2)
Abmessung:	Oberfläche Beh.:			(1)
Zugehörige Unterlagen: PL	Freimassstoleranz: ±	Maßstab:	Ausgabe	22.10.87 A.Ho <i>Bi</i> <i>fa</i> (0)
Ersatz für:	Ersetzt durch:		Datum	Gez. Gepr. Ges. Index
STUDER REGENSDORF ZÜRICH	Benennung: LED PPM METER ESE	Kopie für:	Nummer:	1.913.291-00

LED PPM Meter (10 LED) 1.913.291.00 (1)

Page: 1 of 1

Idx.	Pos.	Part No.	Qty.	Type/Val.	Description
0	C 201	not used		not used	not used
0	C 202	not used		not used	not used
0	C 203	59.34.2680	68p		CER 63V, 5%, N150
0	C 204	59.22.3101	100u		EL 10V 20% RM5
0	C 205	not used		not used	not used
0	C 206	59.06.5474	470n		PETP, 63V, 5%, RM5
0	C 207	59.22.3101	100u		EL 10V 20% RM5
0	D 201	50.04.0125	1N4448		75V, 150mA, 4ns, DO-35
0	D 202	50.04.0132	BAW62		D BAW 62
1	D 203	50.04.0125	1N4448		75V, 150mA, 4ns, DO-35
1	D 204	50.04.0125	1N4448		75V, 150mA, 4ns, DO-35
0	D 205	50.04.0132	BAW62		D BAW 62
0	D 206	not used		not used	not used
0	DL 201	50.04.2146	MV54124A		LED green
0	DL 202	50.04.2146	MV54124A		LED green
0	DL 203	50.04.2146	MV54124A		LED green
0	DL 204	50.04.2146	MV54124A		LED green
0	DL 205	50.04.2146	MV54124A		LED green
0	DL 206	50.04.2146	MV54124A		LED green
0	DL 207	50.04.2146	MV54124A		LED green
0	DL 208	50.04.2119	MV57124A		LED red
0	DL 209	50.04.2119	MV57124A		LED red
0	DL 210	50.04.2119	MV57124A		LED red
0	IC 201	50.09.0101	TL072		Dual op-amp biFET
0	IC 202	50.09.0101	TL072		Dual op-amp biFET
0	IC 203	50.11.0144	LM3916		LED Bar/Dot driver
0	JP 201	54.01.0020	1p		Pin, 1reihig, gerade
0	JP 202	54.01.0020	1p		Pin, 1reihig, gerade
0	JS 201	54.01.0021	Jumper		0.63*0.63mm, Au
0	MP 201	1.913.290.11 1 pce			LED METER PCB
0	MP 202	1.010.012.50 10 pcs			LED-spacer universal
0	MP 203	28.99.0119 2 pcs			ROHRNIETE D 2.5*0.15* 9
0	MP 204	not used		not used	not used
0	MP 205	53.03.0166 2 pcs	8p		DIL-socket 0.3"
0	MP 206	53.03.0175 1 pce	18p		DIL 0.3", löt, gerade
0	MP 207	54.02.0471 11 pcs			Stift d 1.5 * 5.5 löt
0	MP 208	1.010.004.61 1 pce	RM5		Isolierscheibe d=10
0	P 201	54.14.2011	10p		Winkelstecker Au
0	R 201	57.11.3512	5k1		MF, 1%, 0207
0	R 202	57.11.3512	5k1		MF, 1%, 0207
0	R 203	57.11.4222	2k2		MF, 2%, 0207
0	R 204	58.01.9203	20k		Cermet, 10%, 0.5W, vertical
0	R 205	not used		not used	not used
		<i>replaced by W 201</i>			
0	R 206	57.11.4103	10k		MF, 2%, 0207
0	R 207	57.11.4103	10k		MF, 2%, 0207
0	R 208	57.11.3203	20k		MF, 1%, 0207
0	R 209	57.11.4103	10k		MF, 2%, 0207
0	R 210	not used		not used	not used
0	R 211	57.11.3203	20k		MF, 1%, 0207
0	R 212	not used		not used	not used
		<i>replaced by D 203</i>			
0	R 213	57.11.4823	82k		MF, 2%, 0207
0	R 214	57.11.4332	3k3		MF, 2%, 0207
0	R 215	not used		not used	not used
		<i>replaced by D 205</i>			
0	R 216	57.11.6226	22M		MF, 10%, 0207
0	R 217	57.11.4681	680R		MF, 2%, 0207
0	R 218	not used		not used	not used
0	R 219	57.11.4222	2k2		MF, 2%, 0207
0	R 220	57.11.4222	2k2		MF, 2%, 0207
0	R 221	not used		not used	not used
0	T 201	1.022.218.00	1 : 1		EINGANGSSTRAFO 1 : 1
0	W 201	1.010.321.64	RM5.0		U shaped wire 0.6mm

End of List

Comments:

(01) D203, D204 changed